Concept for an Inertial Navigation Mechanism with Accuracy Comparable to GPS Based Upon Radially Oriented Crystals Used to Conduct Light in One Direction and Magnetism in the Other, Rydberg Atoms, and the Selective Use of Anti-Ferromagnetic Bi-Layer Material Around a Magnetized Ball Bearing Suspended in Pressurized Non-Newtonian Fluid

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Introduction

The reality that the most advanced "jamming-proof" GPS systems can not only be jammed but can also have their nuclear clocks' natural timing mechanism corrupted by the use of soliton waves means that hyperaccurate inertial navigation systems may form the future basis of the only reliable navigation system capable of assuring that precision munitions are guided accurately to their targets, ships are not thrown off-course, and aircraft as well as ground units can be sure of their location.

Abstract

In light of that reality, I propose that it is possible to use a combination of available materials to construct an inertial navigation system an order of magnitude more accurate than existing systems.

The core of this proposed system would rely upon something simple: A single, magnetized ball bearing with its surface bestowed with a uniform north polarity and an ultrasmooth surface. That, of course, is only the first element.

The bearing would then be coated partially with a bi-layer anti-ferromagentic material in a checker pattern, leaving alternating spaces uncoated. No magnetism would be conducted through the coated areas, the intention there being to prevent interference between functional magnetic translation actuators. This pattern may be achieved by coating the entire surface of the bearing with the material and using a split-beam ablative laser pulse with precision timing to chip one or both members of the bi-layer away in a finely controlled area. Whether one or both members are chipped away, the anti-ferromagnetic effect would be nullified as intended without corrupting the uniformity of the ball's shape or the overall magnetic field.

The actuators, in this case, would be Rydberg atoms (lithium) arrayed in a sphere around the housing of the ball bearing. This housing would be filled with a pressurized non-Newtonian fluid to modulate the motion of the bearing and to prevent the bearing from contacting the walls of the housing directly. The walls of the housing would be composed of these Rydbergized lithium atoms.

The Rydbergs would project their signature elliptical electrons uniformly in the inward direction, toward the surface of the bearing thanks to intense light directed toward it through a synthetic crystal that forms an additional sphere around the bearing housing. The crystal would be formed into a radial pattern

with each lattice pointing toward and aligned precisely with a different Rydberg atom. It would consist of potentially millions of lattice pathways leading to millions of Rydbergs.

Light would be conducted continuously inward toward the lithium layer, governing the orientation of the valence electron of the lithium. When a change to inertia occurs, the bearing would more closely approach a particular part of the spherical housing. The mechanism would know which way the bearing moves based upon the conduction of magnetism through the Rydberg atoms into the optically and magnetically conductive lattice pathways. Whereas the light would Rydbergize the atoms, the magnetism would counteract this effect to a greater extent the more intense magnetic field, causing the valence electron of the lithium to become less elliptical, leading to a change in the albedo of the lithium measurable by a sensor at the periphery.

Conclusion

It is critical that this and other technologies be developed to protect American force projection capabilities under adverse operating conditions given the tentative status of GPS.

Note: A further-improved accelerometer/inertial navigation system based upon wholly different principles was published by this author on 2 April 2024.

Note 2: Publication 115 was omitted as it was too trivial to justify a separate entry as it was merely the suggestion that gallium ditelluride be investigated as a possible material for use in converting photonic energy into electrical signals and vice versa in the PCM processor.